

CLAIMS

1. A wireless communication system for communicating transmission data comprising:

a physical layer header section; and

a data section;

wherein on the transmission side, a scrambling initial value is generated using at least a part of a physical header section, and scrambling of a data section is performed using the scrambling initial value;

and wherein on the reception side, a descrambling initial value is generated using at least a part of a physical header, and descrambling of a data section is performed using the descrambling initial value.

2. A wireless communication system for communicating transmission data comprising:

a non-scrambled section; and

a scrambled section;

wherein on the transmission side, a scrambling initial value is generated using at least a part of a non-scrambled section, and in the event that the generated scrambling initial value is made up of all zero bits, these are replaced with a known bit sequence other than all zero bits, and scrambling of a scrambled section is performed using the scrambling initial value;

and wherein on the reception side, a descrambling initial value is generated using at least a part of a non-scrambled section, and in the event that the generated descrambling initial value is made up of all zero bits, these are replaced with a known bit sequence other than all zero bits, and descrambling of a scrambled section is performed using the descrambling initial value.

3. A communication system comprising:

a transmission device for transmitting transmission packets; and

a reception device for receiving said transmission packets as reception packets;

said transmission device having

first signal converting means for subjecting a signal to be processed in said transmission packet to a predetermined arithmetic operation according to an internal state, and outputting the signal,

initial-value setting instructing means for indicating regarding whether or not an initial value should be set in the internal state of said first signal converting means,

first initial-value setting means for setting predetermined data included in a physical layer header of said transmission packet as an initial value in the internal

state of said first signal converting means in the event that this initial-value setting instructing means indicate that an initial value should be set in said internal state, and

header generating means for setting initial value setting information indicating regarding whether or not this first initial-value setting means performed said initial value setting to said physical layer header;

and said reception device having

second signal converting means for subjecting a signal to be processed in said reception packet to a predetermined arithmetic operation according to an internal state, and outputting the signal,

header analyzing means for analyzing a physical layer header of said reception packet, and extracting said initial value setting information, and

second initial-value setting means for setting predetermined data included in said physical layer header other than said signal to be processed as an initial value in the internal state of said second signal converting means in the event that said initial value setting information indicates that said initial value setting was performed, and setting the headmost data of said signal to be processed as an initial value in the internal state of said second signal converting means in the event that said initial value

setting information indicates that said initial value setting was not performed.

4. A transmission device comprising:

signal converting means for subjecting a signal to be processed in a transmission packet to a predetermined arithmetic operation according to an internal state, and outputting the signal; and

initial-value setting means for setting predetermined data included in said transmission packet as an initial value in the internal state of said signal converting means.

5. The transmission device according to Claim 4, wherein said initial-value setting means set predetermined data included in a physical layer header of said transmission packet as an initial value in the internal state of said signal converting means.

6. The transmission device according to Claim 5, wherein said predetermined data is the lower 7 bits of a data length field.

7. The transmission device according to Claim 5 further comprising:

header generating means for generating said physical

layer header;

wherein said header generating means set initial value setting information indicating that the initial value in the internal state of said signal converting means is set, in said physical layer header.

8. The transmission device according to Claim 7, wherein said header generating means set an abnormal value in a parity signal included in said physical layer header as said initial value setting information.

9. The transmission device according to Claim 4 further comprising:

initial-value setting instructing means for indicating regarding whether or not an initial value should be set in the internal state of said signal converting means; and

header generating means for generating said physical layer header;

wherein said initial-value setting means set predetermined data included in a physical layer header of said transmission packet as an initial value in the internal state of said signal converting means in the event that said initial-value setting instructing means indicate that an initial value should be set in said internal state;

and wherein said header generating means set initial

value setting information indicating regarding whether or not said initial-value setting means performed said initial value setting, in said physical layer header.

10. A transmission device comprising:

an initial-value register for holding predetermined data included in a transmission packet;

a first shift register;

a second shift register of which an input portion is connected to an output portion of said first shift register;

a first calculator for inputting the output data of said first shift register and the output data of said second shift register, and subjecting the input data to an exclusive-OR operation;

a selector for outputting either the output of said initial-value register or the output of said first calculator to the input portion of said first shift register;

a second calculator for inputting the output data of said selector and the signal to be processed in said transmission packet, and subjecting the input data to an exclusive-OR operation; and

control means for controlling said selector such that the output of said initial-value register is output to the input portion of said first register when an initial value

signal is input to said second calculator as said signal to be processed, following which the output of said first calculator is output to the input portion of said first shift register.

11. A reception device comprising:

signal converting means for subjecting a signal to be processed in a reception packet to a predetermined arithmetic operation according to an internal state, and outputting the signal; and

initial-value setting means for setting predetermined data other than a signal indicating the initializing timing of said signal converting means in said reception packet as an initial value in the internal state of said signal converting means.

12. The reception device according to Claim 11, further comprising:

header analyzing means for analyzing a physical layer header of said reception packet, and extracting initial value setting information;

wherein said initial-value setting means set either the headmost data of said signal to be processed or predetermined data included in said physical layer header other than said signal to be processed as an initial value

in the internal state of said signal converting means according to said initial value setting information.

13. The reception device according to Claim 12, wherein said predetermined data is the lower 7 bits of a data length field.

14. The reception device according to Claim 12, wherein said initial-value setting means set the headmost data of said signal to be processed as an initial value in the internal state of said signal converting means, in the event that a normal value is set in a parity signal of said physical layer header as said initial value setting information, and set predetermined data included in said physical layer header other than said signal to be processed as an initial value in the internal state of said signal converting means, in the event that an abnormal value is set in the parity signal of said physical layer header as said initial value setting information.

15. A reception device comprising:
an initial-value register for holding predetermined data included in a reception packet;
a first shift register;
a second shift register of which an input portion is

connected to an output portion of said first shift register;

a first calculator for inputting the output data of said first shift register and the output data of said second shift register, and subjecting the input data to an exclusive-OR operation;

a selector for outputting either the output of said initial-value register or the output of said first calculator to the input portion of said first shift register;

a second calculator for inputting the output data of said selector and the signal to be processed in said reception packet, and subjecting the input data to an exclusive-OR operation; and

control means for controlling said selector such that the output of said initial-value register is output to the input portion of said first register when an initial value signal is input to said second calculator as said signal to be processed, following which the output of said first calculator is output to the input portion of said first shift register.

16. A reception device comprising:

multiple descramblers for subjecting a signal to be scrambled in a reception packet to descrambling according to each internal state, and outputting the signal;

a selector for outputting any output of said multiple descramblers; and

error determining means for controlling said selector so as to analyze the outputs from said multiple descramblers and select the output satisfying ranges stipulated in all fields, of these outputs.

17. A wireless communication apparatus for communicating transmission data made up of a physical layer header section and a data section, said apparatus comprising:

communication means for transmitting/receiving transmission data over a communication channel;

scrambling/descrambling initial-value generating means for generating an initial value when scrambling or descrambling using at least a part of a physical layer header section; and

scrambling/descrambling means for performing scrambling or descrambling of a data section using said initial value.

18. The wireless communication apparatus according to Claim 17, wherein said scrambling/descrambling means generate a transmission signal sequence scrambled by calculating an exclusive-OR operation between a scrambled sequence generated from a scrambling initial value and a transmission data sequence, or descramble a reception data

sequence by calculating an exclusive-OR operation between a descrambled sequence generated from a descrambling initial value and a reception signal sequence scrambled.

19. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means take an n-bit sequence obtained by extracting n bits from a physical layer header section or a part thereof based on a rule common with an other party of communication, as said initial value when scrambling/descrambling.

20. The wireless communication apparatus according to Claim 19, wherein said scrambling/descrambling initial-value generating means generate said initial value when scrambling/descrambling by extracting n bits including fields of which all bits are not zero, of a physical layer header section.

21. The wireless communication apparatus according to Claim 19, wherein said scrambling/descrambling initial-value generating means take a fixed n-bit sequence, which are not all zero bits, shared with an other party of communication

as said initial value when scrambling/descrambling, in the event that n bits extracted from a physical layer header section are all zeroes.

22. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means extract $(n - k)$ bits from a physical layer header section or a part thereof based on a rule common with an other party of communication (wherein k is a natural number smaller than n), and insert a k -bit sequence such that at least 1 bit thereof includes logic "1", shared with the other party of communication in the extracted bit sequence of said $(n - k)$ bits in a pattern shared with the other party of communication, and generate said initial value when scrambling/descrambling.

23. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means count the number of logics "1" in said physical layer header section or a part thereof, represent the number thereof with n bits in binary, and take this as

said initial value when scrambling/descrambling.

24. The wireless communication apparatus according to Claim 23, wherein in the event that the number of logics "1" counted in said physical layer header section or a part thereof is zero, said scrambling/descrambling initial-value generating means take a fixed n-bit sequence, which are not all zero bits, shared with an other party of communication as said initial value when scrambling/descrambling.

25. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means count the number of logics "1" in said physical layer header section or a part thereof, represent the number thereof with (n - m) bits in binary (wherein m is a natural number smaller than n), and insert an m-bit sequence such that at least 1 bit thereof includes logic "1", shared with an other party of communication in the extracted bit sequence of said (n - m) bits in a pattern shared with the other party of communication, and generate said initial value when scrambling/descrambling.

26. The wireless communication apparatus according to

Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means count the number of logics "1" in said physical layer header section or a part thereof, add x shared with an other party of communication (wherein x is a natural number smaller than 2^n) to the number thereof, represent the result with n bits in binary, and take this bit sequence as said initial value when scrambling/descrambling.

27. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means count the number of logics "0" in said physical layer header section or a part thereof, represent the number thereof with n bits in binary, and take this as said initial value when scrambling/descrambling.

28. The wireless communication apparatus according to Claim 17, wherein in the event that the number of logics "0" counted in said physical layer header section or a part thereof is zero, said scrambling/descrambling initial-value generating means take a fixed n -bit sequence, which are not

all zero bits, shared with an other party of communication as said initial value when scrambling/descrambling.

29. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means count the number of logics "0" in said physical layer header section or a part thereof, represent the number thereof with $(n - m)$ bits in binary (wherein h is a natural number smaller than n), insert an h -bit sequence such that at least one bit thereof is logic "1", shared with an other party of communication in the extracted bit sequence of said $(n - h)$ bits in a pattern shared with the other party of communication, and generate said initial value when scrambling/descrambling.

30. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means count the number of logics "0" in said physical layer header section or a part thereof, add y shared with an other party of communication (wherein y is a natural number smaller than 2^n) to the number thereof,

represent the result with n bits in binary, and take this bit sequence as said initial value when scrambling/descrambling.

31. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means count the number of logics "1" and the number of logics "0" in said physical layer header section or a part thereof respectively, and represent the absolute value of the difference thereof with n bits in binary, and take this as said initial value when scrambling/descrambling.

32. The wireless communication apparatus according to Claim 31, wherein in the event that the difference between the number of logics "1" and the number of logics "0" in said physical layer header section or a part thereof is zero, said scrambling/descrambling initial-value generating means take a fixed n-bit sequence, which are not all zero bits, shared with an other party of communication as said initial value when scrambling/descrambling.

33. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when

scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means count the number of logics "1" and the number of logics "0" in said physical layer header section or a part thereof respectively, represent the absolute value of the difference thereof with $(n - i)$ bits in binary, insert an i -bit sequence such that at least one bit thereof is logic "1", shared with an other party of communication in the extracted bit sequence of said $(n - i)$ bits in a pattern shared with the other party of communication, and generate said initial value when scrambling/descrambling.

34. The wireless communication apparatus according to Claim 17, wherein in the event that said initial value when scrambling/descrambling is n bits in length (wherein n is a natural number), said scrambling/descrambling initial-value generating means count the number of logics "1" and the number of logics "0" in said physical layer header section or a part thereof respectively, obtain the absolute value of the difference thereof, add z shared with an other party of communication (wherein z is a natural number smaller than 2^n) to the absolute value, represent the result with z bits in binary, and take this bit sequence as said initial value when scrambling/descrambling.

35. A wireless communication apparatus for communicating transmission data made up of a non-scrambled section and a scrambled section, said apparatus comprising:

communication means for transmitting/receiving transmission data over a communication channel;

scrambling/descrambling initial-value generating means for generating an initial value when scrambling/descrambling using at least a part of a non-scrambled section, and replacing the initial value with a known bit sequence, which are not all zero bits, in the event that the generated initial value is made up of all zero bits; and

scrambling/descrambling means for performing scrambling or descrambling of a scrambled section using said initial value.

36. A wireless communication apparatus for communicating transmission data made up of one or more pairs of a physical layer header section and a data section, said apparatus comprising:

scrambling/descrambling initial-value acquiring means for acquiring an initial value when scrambling or descrambling from each physical layer header section; and

scrambling/descrambling means, using an initial value extracted from a physical layer header section, for performing scrambling or descrambling of the data section to

be coupled with the physical layer header section.

37. The wireless communication apparatus according to Claim 36, wherein in the event of including a non-scrambled signal between a physical layer header section and a data section, said scrambling/descrambling means delays the start position of scrambling or descrambling of a data section by a predetermined period corresponding to transmission and reception of a non-scrambled section following transmission or reception of a physical layer header section.

38. A wireless communication apparatus for communicating transmission data including two or more physical layer header sections, said apparatus comprising:

scrambling/descrambling initial-value acquiring means for acquiring an initial value when scrambling or descrambling from each physical layer header section; and

scrambling/descrambling means for performing scrambling or descrambling of the subsequent signals using the initial value extracted from each physical layer header section.

39. The wireless communication apparatus according to Claim 38, wherein following the next physical layer header section appearing until said scrambling/descrambling initial-value acquiring means acquire an initial value when

scrambling or descrambling, said scrambling/descrambling means perform scrambling or descrambling of the subsequent signals continuously using the initial value when scrambling or descrambling, which has been acquired last.

40. A wireless communication apparatus for performing space-division multiplexing communication, wherein each physical layer header section corresponding to a data section over each channel subjected to space-division multiplexing is transmitted by time division.

41. The wireless communication apparatus according to Claim 40, further comprising:

scrambling/descrambling initial-value acquiring means for acquiring an initial value when scrambling or descrambling from each physical layer header section; and

scrambling/descrambling means, using the initial value extracted from each physical layer header section, for performing scrambling or descrambling of the data section to be transmitted over the corresponding channel.

42. The wireless communication apparatus according to any one of Claims 36, 38, and 41, wherein said scrambling/descrambling initial-value acquiring means generate an initial value when scrambling or descrambling

using at least a part of a physical layer header section based on a rule common with an other party of communication.

43. A processing method for processing transmission packets based on an initial-value setting instructing step indicating regarding whether or not an initial value should be set in an internal state possessed by a scrambler, said method comprising:

- a procedure for generating a physical layer header of a transmission packet;

- a procedure for inverting a parity signal in said physical layer header, and setting predetermined data included in said physical layer header as an initial value in the internal state of said scrambler, in the event of indicating that an initial value should be set in said internal state; and

- a procedure for subjecting a signal to be processed in said transmission packet to a predetermined arithmetic operation according to the internal state of said scrambler, and outputting this.

44. A processing method for processing reception packets by subjecting a signal to be processed in each reception packet to a predetermined arithmetic operation according to an internal state possessed by a descrambler, said method

comprising:

- a procedure for analyzing a physical layer header of a reception packet;

- a procedure for setting the headmost data of said signal to be processed as an initial value in the internal state of said descrambler in the event that a normal value is set in a parity signal of said physical layer header as initial value setting information, and setting predetermined data included in said physical layer header other than said signal to be processed as an initial value in the internal state of said descrambler in the event that an abnormal value is set in a parity signal of said physical layer header as said initial value setting information; and

- a procedure for subjecting said signal to be processed to said predetermined arithmetic operation according to the internal state of said descrambler, and outputting this.

45. A wireless communication method for controlling communication operation of transmission data made up of a physical layer header section and a data section, said method comprising:

- a scrambling/descrambling initial-value generating step for generating an initial value when scrambling or descrambling using at least a part of a physical layer header section based on a rule common with an other party of

communication; and

a scrambling/descrambling step for performing scrambling or descrambling of a data section using said initial value.

46. A computer program which is described in a computer-readable format so as to execute the processing of transmission packets on a computer system based on initial value setting instructions indicating regarding whether or not an initial value should be set in an internal state possessed by a scrambler, said program comprising:

a procedure for generating a physical layer header of a transmission packet;

a procedure for inverting a parity signal in said physical layer header, and setting predetermined data included in said physical layer header as an initial value in the internal state of said scrambler, in the event of indicating that an initial value should be set in said internal state; and

a procedure for subjecting a signal to be processed in said transmission packet to a predetermined arithmetic operation according to the internal state of said scrambler, and outputting this.

47. A computer program which is described in a computer-

readable format so as to execute the processing of reception packets on a computer system wherein a signal to be processed in each reception packet is subjected to a predetermined arithmetic operation according to an internal state possessed by a descrambler, said program comprising:

- a procedure for analyzing a physical layer header of a reception packet;

- a procedure for setting the headmost data of said signal to be processed as an initial value in the internal state of said descrambler in the event that a normal value is set in a parity signal of said physical layer header as initial value setting information, and setting predetermined data included in said physical layer header other than said signal to be processed as an initial value in the internal state of said descrambler in the event that an abnormal value is set in a parity signal of said physical layer header as said initial value setting information; and

- a procedure for subjecting said signal to be processed to said predetermined arithmetic operation according to the internal state of said descrambler, and outputting this.

48. A computer program which is described in a computer-readable format so as to execute control of communication operation of transmission data made up of a physical layer header section and a data section on a computer system, said

program comprising:

a scrambling/descrambling initial-value generating step for generating an initial value when scrambling or descrambling using at least a part of a physical layer header section based on a rule common with an other party of communication; and

a scrambling/descrambling step for performing scrambling or descrambling of a data section using said initial value.